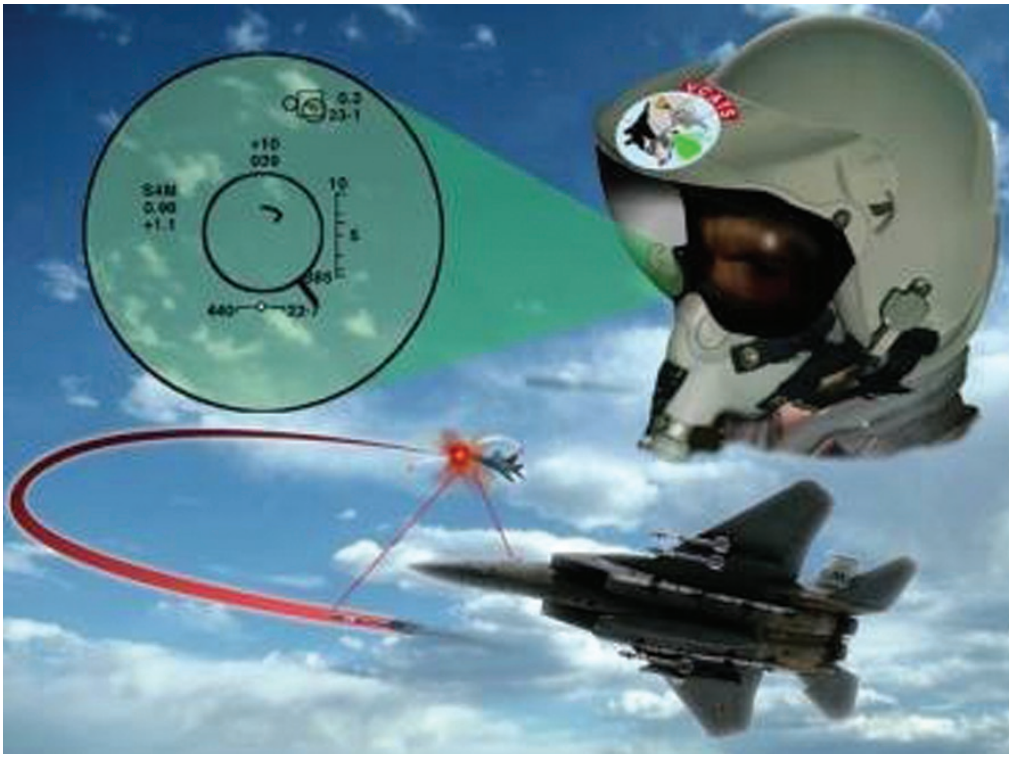
Air Force Research Laboratory|AFRL

Science and Technology for Tomorrow's Air and Space Force

Success Story

HMD VISOR TRANSMISSIVITY MODELING PROMOTES TARGET RECOGNITION



Study of the transmissivity or see-through performance of helmet-mounted displays (HMDs) helps researchers to identify the key parameters that affect pilot target recognition range in a combat environment.

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Accomplishment

The Human Effectiveness Directorate's Crew System Interface Division derived a unique equation that describes the interaction of key parameters on see-through helmet visors. The directorate modeled, tested, and verified the expected results in the laboratory and in field studies before transitioning them to HMD programs for use in HMD and visor designs. The directorate's HMD test results demonstrate a very strong correlation between the model's predictions and field trial results.

Background

HMD testing in recent years shows that the reflective coatings used to enhance symbology contrast on HMDs interfere significantly with combat pilots' tactical situation awareness—the ability to maintain visual contact with low contrast targets and with allied formation members to the maximum possible visual slant range. Luminance contrast requirements for legibility of symbology on see-through HMDs are fairly well established. However, the directorate has not thoroughly investigated the see-through performance for HMDs to identify key parameters and their interaction nor determined their effect, if any, in a combat environment.

Division researchers began a thorough investigation that presented numerous challenges such as deriving an accurate, useful quantitative expression for the effect of coatings on see-through helmet visors and established measurement procedures that would accurately determine if the physical quantities involved would behave as described mathematically. Additionally, after receiving pilot confirmation that the laboratory results correlated with field performance, the researchers applied the field test results with respect to a pilot's ability to find, fix, track, identify, and maintain target identification and location during combat air maneuvers.

Human Effectiveness
Support to the Warfighter

Additional information

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